

### REMARKS

Claims 1, 3-9 and 11-38 stand rejected. By this paper, Applicant has amended Claims 1, 5, 11, 16-18, and 20. Applicant has added new Claims 36-37 which are supported at least by page 8, lines 30-33 and page 22, lines 18-24 of the originally filed specification. No new matter has been added. Thus, Claims 1-3, 5-9, and 11-37 are presented for reconsideration and further examination.

#### I. Discussion of the Rejection of the Claims under §35 U.S.C. §103(a)

The Examiner rejected Claims 1, 3-9, 11-13, 15-20 and 35 under 35 U.S.C. § 103(a) as being unpatentable over Magnus (USPN 5,558,507) in view of Itabashi et al (USPN 5,676,192) or Nakamura et al (USPN 5,778,530) or Smith et al (USPN 6,289,764). Claims 21-32 and 34 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Magnus in view of Itabashi or Nakamura or Smith, in further view of Goi (USPN 5,263,830). Claim 14 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Magnus in view of Itabashi, Nakamura or Smith, in further view of Romanelli (USPN 4,755,168). Claim 33 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Magnus in view of Itabashi, Nakamura or Smith, in further view of Goi in further view of Romanelli.

Applicant respectfully submits that, as stated in the M.P.E.P. at § 2143, "The rationale to support a conclusion that the claim would have been obvious is that all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination yielded nothing more than predictable results to one of ordinary skill in the art." *KSR v. Teleflex*, 550 U.S. at 398, 82 USPQ2d at 1395. Applicant further submits that the cited references fail to describe at least one feature of each of Claims 1, 3-9, and 11-38.

#### A. Claims 1, 3-9, and 11-20

Claim 1 is directed to a pumping apparatus that includes, for example, "a one-piece shaft comprising a single homogenous piece of material with integral cams." Claim 1 also recites "the shaft is without a core region." Independent Claims 5, 11, and 16-18 each recite substantially similar features. Applicant submits that the applied art fails to teach or suggest the above features.

1. The applied art does not disclose, e.g., “the shaft is without a core region”

As previously mentioned, “core region” is described in the specification as the “region through which each cam segment of the shaft or each segment of the shaft runs.” Figure 13 illustrates an embodiment of a shaft in which a core region is provided. Figure 14 illustrates an embodiment of a shaft without a core region. Figure 15 illustrates another embodiment of a shaft without a core region in which the cam segments “rotate about [an] orifice.” See p. 22, lines 23-24.

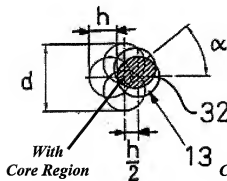


Figure 13

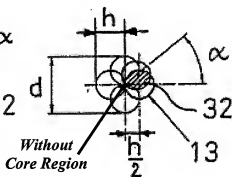


Figure 14

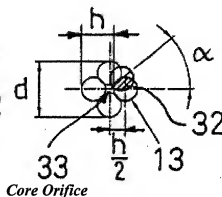


Figure 15

Magnus generally discloses a shaft “made up of stub shafts (8) which project on one size (a) of an eccentric disk (7) and engage in corresponding recesses (9) in the adjacent eccentric disk (7).” See Magnus at c. 1, ll. 37-41. Magnus discloses that the “helically protruding eccentric disks 7 rotate about a common axis x—x. This axis extends vertically, as does the course of the hose. The common axis x—x results from a coaxial addition of stub shafts 8 in the vertical direction.” See Magnus at c. 4, ll. 34-38.

In the prior response, the Applicant had submitted that none of the applied art references disclose a “shaft without a continuous core region.” In response, the Office Action notes that the corresponding recesses between the stub shafts prevent Magnus from having a continuous core region. Applicant has amended Claims 1, 5, 11, and 16-18 to remove the word “continuous” such that each Claim now recites “without a core region.” Applicant respectfully submits that none of the prior art references disclose a shaft “without a core region.”

Particularly, Magnus discloses a core region composed of the “coaxial addition of stub shafts 8 in the vertical direction.” *See* Magnus at c. 4, ll. 34-38. Likewise, Itabashi, Nakamura, Smith, Goi, and Romanelli fail to disclose a shaft without a core region. Itabashi discloses a “cam shaft body 6 including ... a plurality of shaft portions 3.” *See* Itabashi at c. 2, ll. 18-19. Nakamura discloses a camshaft manufacturing method to produce a camshaft 1 having cam lobes 2. *See* Nakamura at Figure 1 and c. 1, ll. 44-46. Smith discloses “a camshaft shaft comprising a central shaft, having concentric journal bearings and eccentric cams.” *See* Smith at c. 2, ll. 2-3. Goi discloses “a peristaltic pump assembly” including a “drive shaft 13.” *See* Goi at c. 4, ll. 31-35. Romanelli discloses a “reversible peristaltic pump” but fails to teach or suggest any characteristics regarding a shaft. Thus, none of the applied art references teaches or suggests a shaft without a core region.

Each of independent Claims 1, 5, 11, and 16-18 recite, among other things, “the shaft is without a core region.” Applicant respectfully submits that the applied art fails to teach, at least, this feature. Thus, Applicant respectfully submits Claims 1, 5, 11, and 16-18 contain patentable subject matter and are allowable for at least this reason.

Claims 3-4, 6-10, 12-15, and 19-20 depend, either directly or indirectly, from one of the above-discussed independent claims. In view of the patentability of their respective base claims and the additional features recited therein, Applicant respectfully submits that the dependent claims are likewise in condition for allowance. Therefore, Applicant respectfully requests withdrawal of the rejections under 35 U.S.C. 103(a).

Claim 20 recites “the cam segments define a continuous core orifice in the region of a center line.” Although Claim 20 is allowed at least for the reasons set forth above, Applicant respectfully submits that none of the applied art illustrates a shaft having a continuous core orifice.

The originally filed specification, at page 22, lines 18-24, states, “the cam segments not only do not overlap or meet one another in a middle region, that is to say in the region of an imaginary center line 21, in the projection of the shaft into the plane, but on the contrary, form an orifice 33 there.” *See* Figure 15 above. The Office Action stated that the recesses 9 of Magnus are a core orifice. Applicant respectfully submits that the recesses do not form a “continuous core orifice” as recited in Claim 20. The Office Action stated that space between W and 1 in

Figure 1 of Magnus is a core orifice. Applicant respectfully submits that the recesses do not form "core orifice in the region of a center line" as recited in Claim 20.

Applicant respectfully submits that none of the applied art discloses a shaft wherein "cam segments define a continuous core orifice in the region of a center line" as recited in Claim 20. Thus, in addition for the reasons set forth above, Applicant submits that Claim 20 is in condition for allowance.

2. The applied art does not disclose, e.g., "a one piece shaft for a pumping apparatus with a peristaltic drive device, the shaft comprising a single homogenous piece of material."

Claim 1 recites "a one-piece shaft comprising a single homogeneous piece of material." Claims 5, 11, and 16-18 each recite a substantially similar feature. As noted by the Examiner on page 2 of the Office Action, Magnus fails to disclose, teach, or suggest this feature. The Examiner further states that Smith, Nakamura, and Itabashi all teach integrally cast cam shafts made of homogenous pieces of material. The Examiner further states that it would be obvious to have made the shaft cams of Magnus from one-piece as taught by Smith, Nakamura, and Itabashi as a design choice, and since it has been held that making in one-piece which has formerly been multiple pieces is a matter of obvious engineering choice. Applicant respectfully disagrees for the reasons set forth below.

a. Magnus and Smith, Nakamura, and Itabahi are not analogous art

Applicant respectfully submits that, as stated in the M.P.E.P. at § 2141.01(a).I, in order "to rely on a reference under 35 U.S.C. § 103, it must be analogous art." Applicant further submits that Smith, Nakamura, and Itabashi are not analogous art. Applicant respectfully submits that in order to qualify as analogous art, "the reference must either be in the field of the applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the inventor was concerned." *In re Oetiker*, 977 F.2d 1443, 1447 (Fed. Cir. 1992).

Prior Office Actions have stated that Smith, Nakamura, and Itabahi are analogous art because "all the references are camshafts." See *Advisory Action* dated March 9, 2009. Applicant respectfully submits that the "field of the applicant's endeavor" is not camshafts. Rather, as stated in the originally filed specification, "This invention relates to a pumping apparatus." See

page 1, line 3. Smith, Nakamura, and Itabahi do not disclose pumping apparatuses. Rather, they disclose “camshaft[s] for an internal combustion engine” See, e.g., *Itabashi* at c. 2, ll. 17-24.

As stated in the specification, the object of the invention is “to form a less complicated pumping apparatus with a peristaltic drive device, which makes available as high a throughput rate as possible.” The Office has failed to set forth evidence that Smith, Nakamura, or Itabashi are “reasonably pertinent” to, e.g., a high throughput.

Because Smith, Nakamura, and Itabashi are neither in the field of the Applicant’s endeavor or reasonably pertinent to the particular problem with which the inventor was concerned, Applicant respectfully submits that Smith, Nakamura, and Itabashi are not analogous art. Accordingly, they cannot be relied upon to form a rejection under 35 U.S.C. § 103.

b. Magnus teaches away from the proposed modification

Applicant respectfully submits that, as stated in the M.P.E.P. at § 2143, “The rationale to support a conclusion that the claim would have been obvious is that all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination yielded nothing more than predictable results to one of ordinary skill in the art.” *KSR Int’l Co. v. Teleflex, Inc.*, 550 U.S. 398 (2007). Applicant further submits “the ‘predictable results’ discussed in *KSR* refers not only to the expectation that prior art elements are capable of being physically combined, but also that the combination would have worked for its intended purpose.” *Deputy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 567 F.3d 1314, 1326 (Fed. Cir. 2009). See also M.P.E.P. at § 2143.01. Applicant further submits that a claim is not obvious “when the prior art teaches away from combining certain known elements.” *KSR*, 550 U.S. at 416; See also M.P.E.P. at § 2145.X.D(2). Applicant respectfully submits that Magnus teaches away from the proposed modification of forming the shaft as one-piece.

Magnus teaches that “[t]he object of the present invention is to simplify the construction of the central control element of such a hose pump, namely the so-called eccentric shaft... while obtaining a basic concept which is favorable for assembly.” (Magnus at c. 1, ll. 31-37). In furthering this concept, Magnus discloses a shaft “made up of stub shafts (8) which project on one size (a) of an eccentric disk (7) and engage in corresponding recesses (9) in the adjacent

eccentric disk (7)” See *Magnus* at c. 1, ll. 37-41. Magnus further discloses that, as “the formation of the shaft is taken over by the eccentric disks, the final length required in each case is also obtained; no shafts of different lengths need be kept ready.” See *Magnus* at c. 1, ll. 45-48. To the contrary, if one were to construct the shaft of Magnus as a single homogenous piece of material, shafts of different lengths *would* need to be kept ready. As Magnus specifically teaches away from one-piece construction, one of ordinary skill in the art would not be motivated to construct the shaft of Magnus as a homogenous piece of material.

Magnus also discloses that the “basic construction” from multiple pieces “has the result of facilitating assembly” and “any repair work which may be required is also substantially easier” as individually damaged or defective elements can be removed. See *Magnus* at c. 2, ll. 40-44. In the case of one-piece construction, the entire shaft would need to be replaced.

If the shaft of Magnus was a formed of a “single piece of homogenous material,” it would not work for its intended purpose of “facilitating assembly” and making “any repair work ... substantially easier.” Further, Magnus specifically teaches away from one-piece construction, stating “no shafts of different lengths need be kept ready.” This would not be the case if the shaft was of one-piece as the length would be fixed.

The Office Action dated April 28, 2009 stated forming a shaft as a single piece of homogenous material “would in fact favor assembly.” The Office Action did not further explain how a single piece of homogenous material which does not require assembly “favor[s] assembly.” The Office Action further stated that “Applicant similarly argues that it would not be advantageous to form a multi-piece element to a single piece.” Applicant has not explicitly argued that it would not be advantageous, but rather that Magnus teaches away from this modification. The Office Action stated that Magnus “teaches different modes [and] does not teach avoiding a mode.” Applicant respectfully disagrees. Magnus teaches that “no shafts of different lengths need be kept ready.” See *Magnus* at c. 1, ll. 45-48. Thus, Magnus teaches away from a “mode” in which different lengths need be kept ready, as would be the case if the shaft were formed of one piece.

Because Magnus teaches away from modifying the shaft disclosed thereon to be formed of a single piece of homogenous material and because such a modification would render the shaft unsuitable for its intended purpose, Applicant respectfully submits that any such modification

(based on the prior art or “engineering choice”) is improper. Accordingly, a prima facie case of obviousness has not been established and a rejection under 35 U.S.C. § 103(a) cannot be sustained.

B. Claims 21-34

Claim 21 recites “a one-piece shaft comprising a single homogenous piece of material with integral cams.” Claim 21 further recites “the shaft has a continuous core region having a diameter less than 3 mm.” Independent Claims 25 and 30 recite substantially similar features. As noted above, Claims 21, 25, and 30 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Magnus in view of Itabashi or Nakamura or Smith in further view of Goi. Applicant respectfully submits that the applied art fails to teach or suggest “a continuous core region having a diameter less than 3 mm.”

1. The applied art does not teach, e.g., “a one piece shaft” wherein “the shaft has a continuous core region.”

The most recent Office Action dated November 3, 2009 stated that “Magnus, Itabashi, Nakamura, and Smith all lack the teaching of a continuous core region.” The Office Action also stated that “Goi teaches a continuous core region of a cam shaft [and] it would have been obvious to one of ordinary skill in the art at the time of the invention to have provided the cam shaft of Magnus as modified by either Smith, Nakamura, or Itabashi with a core shaft.” Applicant respectfully disagrees.

Magnus specifically teaches away from a “providing the cam shaft of Magnus ... with a core shaft.” As noted above, Magnus teaches that the “object of the present invention is to simplify the construction of the central control element, the so-called eccentric shaft, with a reduction in the number of individual parts.” See Magnus at c. 1, ll. 32-35. Magnus teaches “As a result of this development ... the precision rotating part consisting of the shaft is eliminated.” See Magnus at c. 1, ll. 43-44. Applicant respectfully submits that one of ordinary skill would not be motivated to modify Magnus specifically against the “object of the present invention” by adding a part which is specifically eliminated. Accordingly, the proposed modification is improper and the rejection under 35 U.S.C. § 103(a) cannot be sustained.

2. The applied art does not teach, e.g., “the shaft has a continuous core region having a diameter less than 3 mm.”

The most recent Office Action dated November 3, 2009 stated that “Goes does lack the specific size of the continuous core region.” The Office Action also stated that “Nevertheless, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have made the continuous core region less than 3 mm since the claimed value is merely an optimum value.” Applicant respectfully disagrees.

a. Continuous core region size is not recognized in the prior art as a results-effective variable

Applicant respectfully submits that, as stated in the M.P.E.P. at § 2144.05.II.B, “A particular parameter must first be recognized as a results-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation.” *In re Antonie*, 559 F.2d 618 (CCPA 1977). Applicant respectfully submits that the size of the continuous core region is not “recognized as a results-effective variable.”

In a prior Office Action dated April 28, 2009, in response to a similar remark, the Office Action stated “Finally, applicant argues that it would not be obvious to modify the diameter of the continuous core region because it is not a results-effective variable; however, this is a results-effective variable.”

Applicant reiterates that the appropriate inquiry is not whether or not a particular variable is a results-effective variable, but rather whether it was recognized in the prior art as being a results-effective variable. As noted above, the applied art does not disclose any range or other information regarding the diameter of the continuous core region. Thus, Applicant respectfully submits that a *prima facie* case of obviousness with respect to Claims 21-34 cannot be established on the basis of these references.

Applicant further submits that, as stated in the M.P.E.P. at § 2144.03, a finding of fact “that is not based on any evidence in the record lacks substantial evidence support.” *In re Zurko*, 258 F.3d 1379 (Fed. Cir. 2001). Applicant further submits that the Office Action’s blunt rebuttal that “this is a results-effective variable” is unsupported by any evidence in the record and therefore lacks substantial evidence support.



b. Optimization requires the value to be within the prior art

In a prior response, the Applicant noted that a *prima case* of obviousness with respect to ranges applies only “where the claimed ranges ‘overlap or lie inside ranges disclosed by the prior art.’” See M.P.E.P. at § 2144.05.I. The Office has not responded to this remark. Applicant reiterates that none of the prior art references illustrate a device with a continuous core region having a diameter with the claimed range “3 mm or less.”

Applicant respectfully submits that as stated in the M.P.E.P. at § 707.07, “The examiner’s action will be complete as to all matters.” 37 C.F.R. § 1.104. As further stated in §707.07(f), “Where the applicant traverses any rejection, the examiner should, if he or she repeats the rejection, take note of the applicant’s argument and answer the substance of it.” Applicant respectfully requests that the Office respond to all of Applicant’s arguments.

c. Shrinking is not “scaling up.”

The Office Action dated November 3, 2009 stated that it would be obvious to make the continuous core region less than 3 mm because “mere scaling up of a prior art process capable of being scaled up, if such were the case, would not establish patentability in a claim to an old process so scaled.” *In re Reinhart*, 531 F.2d 1048 (CCPA 1976). Applicant respectfully submits that making a device smaller (with a continuous core region less than 3 mm) is not “scaling up of a prior art process.” To the contrary, it is the opposite.

Applicant respectfully submits that one of ordinary skill in the art would not reduce the continuous core region diameter in prior art devices as this would reduce the torsional strength of the device. The Office Action first states that it would be obvious to “provide a core shaft merely to provide support to form the cams on and to increase the torsional strength” but then contradictingly states it would be obvious to “have made the continuous core region less than 3 mm” decreasing the support and the torsional strength. These contradicting rationales cannot both be used to modify the device and reject the pending claims. Further, if one of ordinary skill in the art were to shorten the diameter of the connecting pin 13 of Magnus connecting each of the cam segments or eccentric disks, the forces acting during the use of the shaft will be higher than the forces urging the disks together and the shaft will not withstand these forces and will break. See, e.g., *Magnus* at c. 7, ll. 58-65.

Applicant further submits that one of ordinary skill in the art would not proportionally shrink a prior art device, as the more the diameter of pins and stub shafts and, thus, the installation space is reduced, the more also the stroke is reduced. Thus, the device is less effective in pumping material.

The M.P.E.P. gives further guidance regarding the claims directed to the size of an object at § 2144.04.IV.A, where it states that “In *Gardner v. TEC Systems, Inc.*, 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), *cert. denied*, 469 U.S. 830, 225 USPQ 232 (1984), the Federal Circuit held that, where the only difference between the prior art and the claims was a recitation of relative dimensions of the claimed device and a device having the claimed relative dimensions *would not perform differently than the prior art device*, the claimed device was not patentably distinct from the prior art device.” In the present application, the claimed device *would* perform differently than the prior art device, prior art devices having the relative dimensions cited would be unable to withstand the shearing and torsional forces and would be inoperable.

#### C. Claims 35-37

Claim 35 is directed to a pumping apparatus that includes, for example, “a one-piece shaft comprising a single homogenous piece of material with integral cams.” Claim 35 recites “the ratio of outside diameter to the stroke is less than 4:1.” As noted above, Claim 35 was rejected under 35 U.S.C. § 103(a) as being unpatentable over Magnus in view of Itabashi or Nakamura or Smith.

The Office Action of November 3, 2009, stated that “the above combination discloses all the limitations except the outer diameter and the stroke is less than 4:1. Nevertheless, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have this ratio be less than 4:1 since the claimed values are merely an optimal value.”

Applicant reiterates that, as stated above, a *prima facie* case of obviousness with respect to ranges only applies “where the claimed ranges ‘overlap or lie inside ranges disclosed by the prior art.’” See M.P.E.P. at § 2144.05.I. Applicant further submits that the claimed range of “less than 4:1” does not “overlap or lie inside ranges disclosed by the art.” In fact, the applied art does not disclose any specific ratio regarding the outside diameter to the stroke. Thus, Applicant

respectfully submits that a *prima facie* case of obviousness with respect to Claim 35 cannot be established on the basis of these references.

Applicant also reiterates that, as stated in the M.P.E.P. at § 2144.05.II.B, "A particular parameter must first be recognized as a results-effective variable, i.e., a variable which achieves a recognized result, before the determination of the optimum or workable ranges of said variable might be characterized as routine experimentation." *In re Antonie*, 559 F.2d 618 (CCPA 1977). Applicant respectfully submits that the ratio is not "recognized as a results-effective variable" in the prior art.

Applicant also reiterates that, as stated in the M.P.E.P. at § 2143, "The rationale to support a conclusion that the claim would have been obvious is that all the claimed elements were known in the prior art and one skilled in the art could have combined the elements as claimed by known methods with no change in their respective functions, and the combination yielded nothing more than predictable results to one of ordinary skill in the art." *KSR*, 550 U.S. 398. Applicant respectfully submits that the evidence of record does not establish a known method by which the prior art could be modified to result in the claimed ratio. In particular, Applicant respectfully submits that the claimed ratio is not enabled by the prior art.

For at least the above reasons, Applicant respectfully submits that a *prima facie* case of obviousness has not been established for Claim 35 and respectfully requests withdrawal of the rejection under 35 U.S.C. § 103(a).

### **CONCLUSION**

For the foregoing reasons, it is respectfully submitted that the rejections set forth in the outstanding Office Action are inapplicable to the present claims, and that those claims are in condition for allowance. Accordingly, early issuance of a Notice of Allowance is most earnestly solicited.

Any remarks in support of patentability of one claim should not be imputed to any other claim, even if similar terminology is used. Additionally, any remarks referring to only a portion of a claim should not be understood to base patentability on solely that portion; rather, patentability must rest on each claim taken as a whole.

Although the present communication may include alterations to the application or claims, or characterizations of claim scope or referenced art, Applicant is not conceding in this

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application that previously pending claims are not patentable over the cited references. Rather, any alterations or characterizations are being made to facilitate expeditious prosecution of this application. Applicant reserves the right to pursue at a later date any previously pending or other broader or narrower claims that capture any subject matter supported by the present disclosure, including subject matter found to be specifically disclaimed herein or by any prior prosecution. Accordingly, reviewers of this or any parent, child or related prosecution history shall not reasonably infer that Applicant has made any disclaimers or disavowals of any subject matter supported by the present application.

The undersigned has made a good faith effort to respond to all of the noted rejections and to place the claims in condition for immediate allowance. Nevertheless, if any undeveloped issues remain of if an issue requires clarification, the Examiner is respectfully requested to call Applicant's attorney in order to resolve any such issue promptly.

Please charge any additional fees, including any fees for additional extension of time, or credit overpayment to Deposit Account No. 11-1410.


Respectfully submitted,

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